

STATEMENT OF WORK FORMAT

Energy Dispersive Spectrometer

PCN: 4200562069

Background

The Goddard Space Flight Center (GSFC) Detector Development Laboratory (DDL) has a requirement to acquire an Energy Dispersive Spectrometer (EDS). The EDS system is used in conjunction with a TESCAN VEGA3 XMU LaB6 Scanning Electron Microscope (SEM). The EDS measures the energy and intensity distribution of X-Ray signals generated when the SEM accelerates a focused electron beam on a sample. The EDS is used to provide qualitative and quantitative chemical analysis of devices built and tested in the Detector systems Branch

Objectives

The objective of this project is to procure an Energy Dispersive Spectrometer.

Scope

The scope of this work includes production and delivery of an Energy Dispersive Spectrometer (EDS). The EDS consists of an X-ray transparent window, a semiconducting X-ray detector, a cooling system, an X-Ray pulse processing electronics including preamplifier for data acquisition and a computer for data analysis, and an adjustable stage for positioning the detector in the SEM vacuum chamber. The EDS system will enable improved sample analysis for increased for circuits and devices increasing fabrication capability and improved performance of products manufactured in the DDL. The equipment is essential for nearly all device fabrication projects, especially for technology development projects, taken up by GSFC's Detector System Branch. In particular, the equipment is immediately needed for technology development for the cosmic microwave background polarization technology, microwave kinetic inductor detectors, Far-Infrared Detectors, Large Format Magnetic Calorimeters, and Microfluidic Components which are important to Goddard's lines of business.

No prototypes or one-of-a-kind systems will be considered. The unit must be a production model with at least 5 similar units working in the field.

- a) Design of Energy Dispersive Spectrometer at the vendor location.
- b) Approval of the design by the GSFC technical representative, communicating requirements to GSFC for installation including electrical power needs, gases vacuum and other utilities as required.
- c) Construction of Energy Dispersive Spectrometer at the vendor facility.
- d) Crating and Shipping the unit to GSFC where the vendor's personnel shall install it.
- e) Installing, demonstrating, and training, of approximately three GSFC personnel, on the EDS at GSFC.

- f) Phase II/acceptance testing of the EDS at NASA.

Tasks or Requirements

The Supplier shall insure that the EDS is equipped with the following equipment and meet the following requirements prior to Acceptance of System:

1. A brand new unit is required; no used equipment or accessories, listed below, are acceptable.
2. Has the ability to meet current industry standard requirements for safety including the use of interlocks for hazardous areas including high voltages and moving parts.

3. EDS Detector

- 3.1. The EDS detector shall be a Silicon Drift Detector.
- 3.2. Energy resolution <130 eV at 5.89keV.
- 3.3. LN2 free operation (operation temperature > -30C) with Peltier cooling to operation temperature in less than 3 minutes
- 3.4. Shall include signal processing electronics for data acquisition with maximum input count rate > 1,000,000 counts per second
- 3.5. Minimum 60mm² detector area, greater area detector preferred.
- 3.6. Light element window sealed allowing detection down to atomic number 4 (Be).
- 3.7. Motorized retraction system for moving the detector in and out of position with respect to the sample. Compatible with feedthrough ports on TESCAN VEGA3 XMU
- 3.8. Must allow real time acquisition and image processing.
- 3.9. Maximum detector weight <

4. EDS Software

- 4.1. Shall interface with TESCAN VEGA3 SEM for simultaneous imaging and X-ray analysis. Shall read analytical conditions from the SEM such as voltage magnification and working distance.
- 4.2. Shall have automatic software controlled calibration
- 4.3. Must allow selection between automatic and manual maximum pulse throughput.
- 4.4. Shall allow user selectable detail on K, L, and M lines in display of spectrum.
- 4.5. Shall be compatible with SEM signals from secondary electron detector and backscatter electron detector.
- 4.6. Shall have Point, Line and Mapping data acquisition.
- 4.7. Analysis and data acquisition shall allow full spectral mapping at every pixel in a two dimensional map. Shall allow the user to take mapping data without specifying which elements to analyze prior to taking data.
- 4.8. Software must have integrated coating correction (removal of coating spectra) for samples coated with conductive films (C,Au) for reduced charging.
- 4.9. Shall allow automatic spectrum analysis from user defined points and areas of arbitrary shape in an image
- 4.10. Shall include maximum pixel spectrum for locating rare elements in map.
- 4.11. Shall include capability for spectral line scans with spectra data base at every pixel.

- 4.12. Shall have capability to read legacy NASA GSFC data files generated from Princeton Gamma Tech EDS.
- 4.13. Shall include P/B ZAF algorithm for evaluating X-ray peaks as well as bremsstrahlung background. Shall have local peak to background ratio (P/B) self-calibrating.
- 4.14. Shall have automatic report generation of data compatible with .pdf .tiff, .jpg and .png formats.

5. PC interface

- 5.1. Intel Core i5 3.3GHz computer includes workstation computer operating Windows 7 or greater.
- 5.2. 500GB Hard disk drive
- 5.3. 4GB RAM
- 5.4. DVD- RW drive
- 5.5. LCD monitor minimum size 24", keyboard mouse and/or trackball

7 Facilities

- 7.1 The EDS and all required components will operate from standard 120V/60Hz power.
- 7.2 The EDS shall not require any source of cooling water for operations.
- 7.3 Exterior surface parts shall be clean and free of grease or dust and compatible with operation in a Class 100 cleanroom environment.

8 Installation and Training

- 8.1 The price of the EDS shall include installation at GSFC. Installation shall include a demonstration that the tool is within compliance with the above specifications.
- 8.2 The price of the EDS must include delivery of the instrument to Goddard Space Flight Center.
- 8.3 At the completion of installation and demonstration, the Supplier shall provide on-location training at GSFC.

9 Documentation and Warranty

- 9.1 A full set of all written documentation shall be provided. This will include user manuals or equivalent as well as copies of any software, and any manuals for the software included with the system. This documentation shall be received by GSFC with the system hardware.
- 9.2 The Supplier shall offer the GSFC at least the same warranty terms, including offers of extended warranties, offered to the general public in customary commercial practice. Warranty terms must be included in the system price. The period of warranty will begin upon acceptance of the system.

The Supplier shall install the system on-site at GSFC's Detector Development Laboratory or another, designated, laboratory in NASA/GSFC's Building 11 and provide operator training of the system. Together with GSFC technical personnel, the Supplier shall

review the system, demonstrate and confirm that the system functions properly based on the specifications above.

Supplier shall provide a Warranty of at least 12 Months (Parts and Labor), guaranteed to meet factory specifications.

Installation and training shall be performed by a factory trained technician at NASA/GSFC.

The technical merit of the Suppliers' proposal will be evaluated in terms of by how much they exceed the technical specifications listed in this statement of work.

Deliverables or Delivery Schedule

Deliver complete specified (as described above) system. Set up and install all components at GSFC (in Bldg11 or in the DDL).

1. Demonstrate system with specified performance/acceptance criteria (described above). Acceptance of system will be conditional upon successful demonstration of functions.
2. Provide user training for equipment operation.
3. Equipment warranty on parts and labor for at least one year.
4. Operational manuals and maintenance manuals with circuit schematics and layouts.

Delivery Schedule

Within 20 weeks after receipt of order.

Government-Furnished Equipment and Government-Furnished Information

No Government-furnished equipment (GPE) and Government-furnished information (GFI) will be required

Security

The Supplier Representative who will be installing the Energy Dispersive Spectrometer and Training NASA personnel must be a US Citizen

Place of Performance

The Construction of the Energy Dispersive Spectrometer shall be performed at the Supplier's facilities

The Installation and Training shall be performed at NASA/GSFC, Greenbelt, Maryland.